



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/954,806

09/18/2001

Hiroyuki Akashi

09792909-5185

8207

26263 7590 05/15/2007
SONNENSCHN NATH & ROSENTHAL LLP
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT

PAPER NUMBER

1745

MAIL DATE

DELIVERY MODE

05/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/954,806

Applicant(s)

AKASHI ET AL.

Examiner

Raymond Alejandro

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-7 and 13-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-7 and 13-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 02/22/07.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The following Examiner's letter is in reply to the amendment filed on 04/19/04. The 35 USC 103 rejection has not been overcome yet by the applicant. Applicant's amendment continues to fail to sufficiently rebut the prima facie obviousness rejection shown infra. Refer to applicant's amendment for details about applicant's rebuttal arguments and remarks. Therefore, the present instant claims remain rejected over the same art as set forth hereinafter and for the reasons of record:

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 02/22/07 was considered by the examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 4-7 and 13-17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the EP 997960 reference.

The instant claims are directed to a secondary battery wherein the disclosed inventive concept comprises the specific ratio of the electrode layer thickness. Other limitations include the

Art Unit: 1745

specific thickness range; the negative electrode material; the light metal and the particular electrolyte.

As to claims 1 and 13-14:

The EP'960 reference teaches a non-aqueous electrolyte secondary battery comprising an electrode group (2) including a positive electrode (12), a negative electrode (13) including a material for absorbing-desorbing lithium, and a separator (3), a non-aqueous electrolyte impregnated in the electrode group and including a non-aqueous solvent and a lithium salt (electrolyte) dissolved in the solvent (ABSTRACT/section 0008).

(*Emphasis added*→) The EP'960 discloses the use of cyclic carbonates such as propylene carbonate (PC), ethylene carbonate (EC) and mixing it with another solvent such as diethyl carbonate (DEC) and methyl ethyl carbonate (MEC) (P00045-0047). Shown is the desirability of using a cyclic carbonate and/or a chain carbonate as a solvent as it permits improving the charge-discharge efficiency and cycle characteristics.

15 [0045] It is desirable to use a cyclic carbonate together with BL in the present invention because the cyclic carbonate permits improving the charge-discharge efficiency.

[0046] The cyclic carbonate used in the present invention includes, for example, propylene carbonate (PC), ethylene carbonate (EC), vinylene carbonate (VC), and trifluoropropylene carbonate (TFPC). Particularly, if EC is used together with BL, the charge-discharge characteristics and the large discharge characteristics can be markedly improved. It is also desirable to prepare a mixed solvent by mixing BL with at least one kind of a third solvent selected from the group consisting of PC, VC, TFPC, diethyl carbonate (DEC), methyl ethyl carbonate (MEC) and an aromatic compound. The mixed solvent of the particular construction permits improving the charge-discharge cycle characteristics.

20 [0047] In order to decrease the viscosity of the mixed solvent, it is possible for the nonaqueous solvent containing BL to further contain 20% by volume or less of a solvent having a low viscosity selected from the group consisting of,
25 for example, a chain carbonate, a chain ether, and a cyclic ether.

As to the limitation that the positive electrode includes a positive electrode mixture layer capable of occluding and releasing light metal, the EP'960 reference teaches that the positive electrode active material are various oxides such as lithium manganese composite oxide, lithium-containing nickel oxide, lithium-containing cobalt oxide, lithium-containing nickel cobalt

Art Unit: 1745

oxide, lithium containing iron oxide, and lithium containing cobalt oxide, of these materials,

lithium containing cobalt oxide LiCoO_2 , lithium containing nickel cobalt oxide

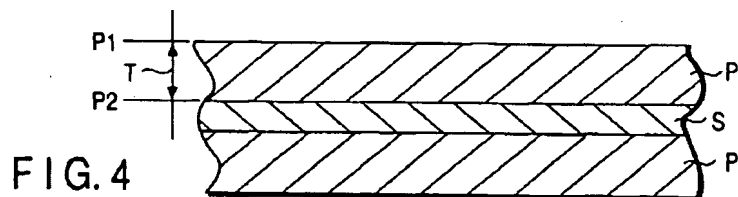
$\text{LiNi}_{0.8}\text{Co}_{0.2}\text{O}_2$, and lithium manganese composite oxide LiMn_2O_4 are preferably (section

0019). *Although the instant claims do not recite the particular composition of the positive electrode, it is noted that the positive electrode active materials of the prior art has identical product compositions as the positive electrode active material disclosed by the applicant (see applicants' specification, application 09/954806, page 6, line 24 to page 7, line 12).*

Accordingly, products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property i.e. capable of occluding and releasing light metal, is necessarily present in the prior art active material.

In addition, it is disclosed that the negative electrode layer containing an active material is made from carbon material which absorbs lithium. Examples of this carbon material are a graphitized material and carbonaceous material such as graphite (section 0027). Accordingly, products of identical chemical composition cannot have mutually exclusive properties, and thus, the claimed property i.e. capable of precipitating and dissolving light metal thereon, is necessarily present in the prior art active material.

Figure 4 shows the thickness of a positive electrode active material layer wherein P represents the electrode layer (section 0119).



It is also disclosed that the positive electrode has a structure in which an electrode layer containing an active material is carried by one or both surfaces of the collector (section 0018). It is also disclosed that the negative electrode has a structure in which an electrode layer containing an active material is carried by one or both surfaces of the collector (section 0026)

The EP'960 reference teaches that the thickness of the positive electrode layer should be 10-100 μm ; it follows that where positive electrode layers are formed on both surfaces of the collector, one positive electrode layer has a thickness of 10-100 μm , naturally, the total thickness of the two positive electrode layers formed on both surfaces of the collector is 20-200 μm . It is also disclosed that **the upper limit in the thickness is preferably 85 μm** (section 0119/ 0158) (**← emphasis added**). Hence, the EP'960 reference envisions the claimed thickness, at least, from 80 to 100 μm when one layer is formed, and at least, from 80 to 200 μm when two layers are formed thereon.

The EP'960 reference teaches that the thickness of the negative electrode layer should be 10-100 μm ; it follows that where negative electrode layers are formed on both surfaces of the collector, one negative electrode layer has a thickness of 10-100 μm , naturally, the total thickness of the two negative electrode layers formed on both surfaces of the collector is 20-200 μm . It is also disclosed that **the upper limit in the thickness is preferably 85 μm** (section 0125/ 0161) (**← emphasis added**). Hence, the EP'960 reference envisions the claimed thickness, at least, from 80 to 100 μm when one layer is formed, and at least, from 80 to 200 μm when two layers are formed thereon.

Thus, given that the EP'960 reference has clearly disclosed that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85 μm , as well,

in general, electrode layers having a thickness of 10-100 μm , it is fairly reasonable to contend that the EP'960 reference envisions at first the claimed thickness, and consequently, the claimed ratio A/B. *(Emphasis added→)* For instance, if the upper limit in the thickness for the positive electrode is chosen to be 100 μm , then the thickness of the negative electrode can be thus chosen to be about 84.3 μm which still satisfies a preferred electrode thickness; or in the other hand, if the positive electrode thickness is chosen to be 100 μm , then the thickness of the negative electrode can be thus chosen to be 80 which is still within the generally disclosed range. In this regard, it is noted that this examiner's position is taken in light of the specific electrode thickness exemplified in TABLE 6 (See portions of TABLE 6 below) which shows positive electrodes and negative electrodes having different thickness dimension. Therefore, the EP'960 reference does not strictly require that the thickness dimension of both electrodes (i.e. the positive electrode and the negative electrode) be identical or the same. In other others, the EP'960 reference at once envisages different thickness for both electrodes. Thus, the battery of the EP'960 still meets the claimed ratio (A/B) requirement of being equal to or greater than 1.1.

(Emphasis added→) Furthermore, as illustrated in Table 6- Examples 26-35, the EP'960 reference shows with sufficient specificity that the thickness of the positive electrode is greater than the thickness of the negative electrode. That is to say, the EP'960 reference at once envisages the general concept of having positive electrode layers thicker than negative electrode layers. In addition to that, Table 6 correlates initial capacity of batteries to electrode thicknesses (page 38, lines 28-30).

Table 6 below shows specific examples wherein the thickness of the positive electrode differs from the thickness of the negative electrode:

Table 6

	Capacity (Ah)	Thickness of one layer of positive electrode (μm)	Thickness of one layer of negative electrode (μm)
Example 26	0.32	48	45
Example 27	0.35	60	56
Example 28	0.30	39	36
Example 29	0.25	24	23
Example 30	0.12	10	9.5
Example 31	0.30	48	45
Example 32	0.31	48	45
Example 33	0.33	48	45
Example 34	0.31	48	45
Example 35	0.28	48	45
Example 36	0.36	60	65
Example 37	0.38	80	80
Example A	0.35	87	90
Example B	0.05	8	8
Comparative example 12	0.30	105	108
Comparative example 13	0.10	8	8

(Continued)

EP 0 967 860 A2

Examiner's note: As to the limitation that the capacity of the negative electrode is expressed by the sum of a first capacity component by occluding and releasing light metal and a second capacity component by precipitating and dissolving light metal, as well as the specific charge capacity of the electrodes (charge capacity of the positive electrode being larger than the charge capacity of the negative electrode) and the relationship between the overcharge voltage and the batter voltage, since applicants disclose:

a) the battery of the present invention is engineered in order to attain the second component, wherein such battery engineering relies on the battery featuring a negative electrode comprising a graphitic material with certain charge capacity and a positive electrode of Li-oxide based material;

b) that during the process of charging, lithium metal starts to precipitate in the negative electrode at the point where the open circuit voltage (battery voltage) is lower than the overcharge voltage. In other words, the capacity of the negative electrode is expressed by the sum of the capacity component of occluding/releasing lithium and the capacity component of

Art Unit: 1745

precipitating /dissolving lithium metal. The overcharge voltage means an open circuit voltage when the battery is overcharged, and indicates the voltage higher than the open circuit voltage of the full charged battery (see applicants' specification, application 09/954806, page 14, lines 13-24),

c) the ratio of the thickness (A/B) varies depending on the capacities of the positive electrode mixture layer and the negative electrode mixture layer. If the ratio (A/B) is equal to or more than 0.92, lithium metal can be stably precipitated in the negative electrode in the state where the open circuit voltage is lower than the overcharge voltage, and a high energy density and an excellent cycle characteristic can be obtained (see applicants' specification, application 09/954806, page 15, lines 9-23),

Thus, it asserted that having shown the battery of the prior art does: 1) include the same positive electrode and negative material composition; and, b) meet such ratio (A/B) requirement (i.e. the ratio (A/B) of the thickness A of the positive electrode mixture layer and thickness B of the negative electrode mixture layer is 0.92 or more), all the above-mentioned battery characteristics and/or functions is thus inherent as the battery structure recited in the reference is substantially identical to that of the instant claims, and therefore, claimed properties or functions are presumed to be inherent (MPEP 2112. Requirements of Rejection Based on Inherency). Thus, the prior art battery seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in the battery described in the reference, and that it would be so recognized by persons of ordinary skill.

Concerning claim 4:

Art Unit: 1745

It is disclosed that the negative electrode layer contains an active material being made from carbon material which absorbs lithium. Examples of this carbon material are a graphitized material and carbonaceous material such as graphite (section 0027).

As to claim 5:

The EP'960 reference teaches that the positive electrode active material are various oxides such as lithium manganese composite oxide, lithium-containing nickel oxide, lithium-containing cobalt oxide, lithium-containing nickel cobalt oxide, lithium containing iron oxide, and lithium containing cobalt oxide, of these materials, lithium containing cobalt oxide LiCoO_2 , lithium containing nickel cobalt oxide $\text{LiNi}_{0.8}\text{Co}_{0.2}\text{O}_2$, and lithium manganese composite oxide LiMn_2O_4 are preferably (section 0019). *Thus, the light metal includes lithium.*

As to claim 6-7:

The EP'960 reference teaches that examples of the electrolytic salt contained in the non-aqueous electrolyte are lithium salts such as LiPF_6 which is also most preferred (sections 0051). It is disclosed that the amount of the electrolytic salt dissolved in the non-aqueous solvent should desirably be 0.5 to 2.0 mol/l (section 0052). *Comparative Examples 4 and 6* shows that LiPF_6 was dissolved in a mixed solvent in an amount of 1mol/L and 0.8mol/L, respectively (sections 0214 and 0216/Table 2). It is noted that the non-aqueous solvent is unspecified for purposes of determining its mass of substance per unit volume (density). Thus, the specific example in the prior art is understood to be within the claimed range absent that no specific nonaqueous electrolyte solvent is claimed.

On the matter of claims 15-17:

The EP'960 mentions that a carbonaceous material such as graphite can be used as the negative electrode material (section 0026-0027).

The EP'960 reference disclose a secondary battery according to the abovementioned aspects. However, the EP'960 reference does not expressly disclose the specific electrode thickness ratio A/B.

In view of the above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the battery of the EP'960 reference by having the specific electrode thickness ratio A/B as the EP'960 reference itself discloses that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85 μm , as well, in general, electrode layers having a thickness of 10-100 μm , and these thickness are preferable simply because if the electrode layer is thicker than the specific dimension, the non-aqueous electrolyte concentrates on the surface of the positive electrode at rapid charge and at rapid discharge, and as a result, the electrode reaction scarcely proceeds inside the electrode, leading to a shortened cycle life; in addition, where the thickness falls within this range, the large discharge characteristics and the cycle life are markedly improved. Thus, one of ordinary skill in the art would find good motivation to make positive electrodes and negative electrodes within the claimed range. Hence, the EP'960 reference directly teaches the electrode thickness within the claimed range, and still meets the claimed ratio (A/B) requirement of being equal to or greater than 1.1.

Moreover, where the only difference between the prior art and the claims is a recitation of relative dimensions (*i.e. changes in size/proportion*) of the claimed feature and a feature having the claimed relative dimensions would not perform differently than the prior art device/element/

Art Unit: 1745

member, the claimed device/element/member is not patentably distinct from the prior art device/element/member. That is, limitations relating to the size of the feature/element/member are not sufficient to patentably distinguish over the prior art as it is noted that changes in size (*thickness*) is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular thickness of the claimed electrode is significant. *In re Rose* 105 USPQ 237; *In re Rinehart* 189 USPQ 143; *In Gardner v. TEC Systems, Inc.*, 220 USPQ 777 & 225 USPQ 232, (See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale).

Likewise, the EP'960 reference recognizes that the electrode thickness per se is a variable which achieves a recognized result, thus, the claimed range of the electrode thickness and thus, the A/B ratio result from the characterization as routine experimentation of an optimum or workable range. Accordingly, the electrode thickness is being construed as a result-effective variable. *In re Aller* 105 USPQ 233, 235; *In re Hoeschele* 160 USPQ 809, *In re Antonie* 195 USPQ 6 (See MPEP 2144.05 II. Optimization of Ranges).

Response to Arguments

4. Applicant's arguments filed 04/19/07 have been fully considered but they are not persuasive.
5. Now, the one argument raised by the applicant is that "*the EP'960 fails to disclose or provide motivation for using an electrolyte containing a main non-aqueous solvent selected from the group consisting of ethylene carbonate, propylene carbonate, diethyl carbonate, methyl ethyl carbonate, and any mixture thereof*". But applicant has erred in advancing the aforementioned

Art Unit: 1745

argument because: (*emphasis added*→) the EP'960 discloses the use of cyclic carbonates such as propylene carbonate (PC), ethylene carbonate (EC) and mixing it with another solvent such as diethyl carbonate (DEC) and methyl ethyl carbonate (MEC) (P00045-0047 of EP'960). Shown is the desirability of using a cyclic carbonate and/or a chain carbonate as a solvent as it permits improving the charge-discharge efficiency and cycle characteristics.

- 15 [0045] It is desirable to use a cyclic carbonate together with BL in the present invention because the cyclic carbonate permits improving the charge-discharge efficiency.
- [0046] The cyclic carbonate used in the present invention includes, for example, propylene carbonate (PC), ethylene carbonate (EC), vinylene carbonate (VC), and trifluoropropylene carbonate (TFPC). Particularly, if EC is used together with BL, the charge-discharge characteristics and the large discharge characteristics can be markedly improved. It is
- 20 also desirable to prepare a mixed solvent by mixing BL with at least one kind of a third solvent selected from the group consisting of PC, VC, TFPC, diethyl carbonate (DEC), methyl ethyl carbonate (MEC) and an aromatic compound. The mixed solvent of the particular construction permits improving the charge-discharge cycle characteristics.
- [0047] In order to decrease the viscosity of the mixed solvent, it is possible for the nonaqueous solvent containing BL to further contain 20% by volume or less of a solvent having a low viscosity selected from the group consisting of,
- 25 for example, a chain carbonate, a chain ether, and a cyclic ether.

The examiner does not understand why applicant has advanced the aforementioned argument in favor of patentability of his invention as the teaching of the EP'960 concerning the employment of carbonate solvents is CLEAR enough. Applicant's representative is respectfully requested to carefully read and understand the teachings of any reference before advancing any argument that add nothing to the patentability of the invention at hand. Present claims have been more than twice rejected, present application is ready for appeal. Enough has been said.

The following responses to applicant's arguments were presented in prior office actions, and are incorporated and/or maintained herein for the reasons of record:

6. Applicant has argued that "EP'960 does not disclose or suggest positive and negative electrode wherein a charge capacity of the positive electrode is larger than the charge capacity of the negative electrode". In response, the examiner contends that the charge capacity of both the positive electrode and the negative electrode are associated with the specific materials used to

make both electrodes. Accordingly, since the prior art of record teaches substantially the same electrode materials or substantially similar electrochemical active materials for the disclosed battery (*i.e. negative electrode: carbonaceous material such as graphite, coke, carbon and the like, and positive electrode: lithiated transition metal oxides capable of occluding/releasing light metal*), it is reasonable to contend that the disclosed positive and electrode materials, when paired, are capable of delivering the same charge capacity characteristics as instantly claimed. Since PTO does not have adequate equipment to perform respective analytical test, applicant carries the burden of providing scientific or objective evidence to show that the battery disclosed by the EP'960 is at all incapable of exhibiting the claimed charge capacity.

7. Applicant has also argued that "EP'960 does not disclose or suggest a battery wherein, when a voltage of the battery is lower than an overcharge voltage of the battery during charging of the battery, light metal precipitates on a surface of the negative electrode after a charge capacity of the negative electrode has been exceeded". In the first place, the examiner states that the limitation or clause "when a voltage of the battery is lower than an overcharge voltage of the battery during charging of the battery" is simply a conditional statement or operational proviso which fails to positively limit the present invention as instantly claimed. In other words, light metal precipitation on the negative electrode surface occurs only when such a condition takes place. Meanwhile, when battery voltage exceeds the overcharge voltage, if ever possible, light metal precipitation does not necessarily occur. Therefore, the above limitation or clause is not deemed to be a positive limitation required by the secondary battery at any time. Again, such a precipitation is only visible or manifested when battery is operated under certain voltage conditions. Nevertheless and without losing the scope of the foregoing Examiner's statement, the

Art Unit: 1745

examiner verily believes that by having shown that the battery of the prior art does: 1) include the same positive electrode and negative material composition; and, b) meet the specified ratio (A/B) requirement (i.e. the ratio (A/B) of the thickness A of the positive electrode mixture layer and thickness B of the negative electrode mixture layer is 0.92 or more), all the above-mentioned battery characteristics and/or functions are thus inherent as the battery structure recited in the reference is substantially identical to that of the instant claims, and therefore, claimed properties or functions are presumed to be inherent (**MPEP 2112. Requirements of Rejection Based on Inherency**). See rejection and Examiner's note above. Applicant has done nothing to rebut the prima-facie case of inherency relied upon by the examiner to address these limitations. No objective evidence has been provided to proof otherwise. From an Examiner's perspective, this voltage characteristic of the battery is basically a measurable characteristic thereof which fails to better define a structure or physical characteristic of the battery. Therefore, since PTO does not have adequate equipment to perform respective analytical test to measure voltage characteristic of the battery, applicant again bears the burden of providing scientific or objective evidence to show that the battery disclosed by the EP'960 is at all incapable of exhibiting the claimed voltage characteristic.

8. The gist of applicant's arguments is solely grounded on the assertion that the amended "ratio A/B of 1.186 or more" is not disclosed in the prior art of record. However, this assertion is still insufficient and ineffective to overcome the prima-facie case of obviousness. Concerning this matter, the examiner points that Table 6 of the EP'960 reference directly exemplified positive electrode and negative electrodes having different thickness. Furthermore, it can be observed from viewing Table 6 of the EP'960 reference direct exemplifications of positive

Art Unit: 1745

electrode thicker than a negative electrode. In support of the prima-facie case of obviousness articulated by the examiner, it can be further observed that EXAMPLE 36 (See Table 6 of the EP'960) employs a negative electrode with a thickness of 80 μm . In addition to that, the EP'960 reference directly teaches that where positive electrode layers are formed a positive layer has a thickness of 10 to 100 μm (Paragraph 0119 of the EP'960 reference). Of particular interest is the teaching that if the positive electrode layer is thicker than 100 μm , the non-aqueous electrolyte is concentrated on the surface of the positive electrode at rapid charge and at rapid discharge. As a result, the electrode reaction scarcely proceeds inside the positive electrode, leading to a shortened cycle life (Paragraph 0119 of the EP'960 reference). Thus, the EP'960 reference expressly warns against using positive electrode layers thicker than 100 μm . That is to say, the EP'960 reference advises to limit the thickness of the positive electrode layer to a magnitude of 100 μm or less. That being said, the examiner states that a combination of the specific teachings of the EP'960 reference including a negative electrode with a thickness of 80 μm as exemplified in Example 36 and a positive electrode having a layer thickness of 100 μm for the reasons above would result in a ratio A/B of 1.25 which fully meets the claimed ratio A/B of 1.186 or more. It is noted that the foregoing teachings of the EP'960 does not represent pick-and-choose of possible thicknesses, indeed, they are derived from a specific exemplification and concerns presented in the EP'960 reference.

In this case, it is further noted that, at least, the end point of 100 μm constitutes a valid data point and thus it fully encompasses the claimed requirement as the end point represents a specific disclosure of a discrete embodiment of the invention disclosed by the prior art which

amounts to a complete description and, therefore, a direct teaching fully encompassing the claimed range. See **Ex Parte Lee 31 USPQ2d 1105**.

While the EP'960 reference furnishes examples of positive electrodes and negative electrodes having particular distinct thicknesses, the EP'960 reference clearly is not limited to that exemplified embodiment. Indeed, the EP'960 reference makes it clear that examples of Table 6 showing specific thicknesses are merely illustrative by expressly noting that other thicknesses (*i.e. thickness ranging from 10 to 100 μm are preferred*) for both the positive electrode and the negative electrode layers are within the purview of the disclosed invention. See paragraph 0119 and 0125 as well as Table 6 itself of the EP'960 reference.

Based on the totality of record, including due consideration of the applicant's arguments, specification and evidentiary embodiments, the examiner determines that the preponderance of evidence weighs most heavily in favor of obviousness within the meaning of Section 103(a). Accordingly, the examiner reaffirms the examiner's original decision rejecting claims 1, 4-7 and 13-14 under 35 U.S.C. 5 103 as unpatentable over the disclosure of the EP'960 reference by itself.

9. Applicant has contended that the prior art of record does not expressly disclose "*the specific ratio of the thickness A/B (for the positive electrode layer and the negative electrode layer, respectively) to be 1.186 or more*" and that "*there is no teaching or suggestion...that would suggest that the thickness of the positive electrode layer needs to be thicker or should be thicker than the thickness of the negative electrode layer*". Firstly, assuming that there is adequate support for the specific claimed A/B ratio (*see items 1-2 supra*), the examiner asserts that applicant is incorrect and inaccurate for the reasons and analysis presented *infra*:

A) Given that the EP'960 reference has clearly disclosed that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85 μm , as well, in general, electrode layers having a thickness of 10-100 μm , it is fairly reasonable to contend that the EP'960 reference envisions at first the claimed thickness, and consequently, the claimed ratio A/B. **(Emphasis added→)** For instance, if the upper limit in the thickness for the positive electrode is chosen to be 100 μm , then the thickness of the negative electrode can be thus chosen to be about 80 μm which still satisfies a preferred electrode thickness; or in the other hand, if the positive electrode thickness is chosen to be 100 μm , then the thickness of the negative electrode can be thus chosen to be about 84.3 which is still within the generally disclosed range. In this regard, it is noted that this examiner's position is taken in light of the specific electrode thickness exemplified in TABLE 6 (See portions of TABLE 6 below) which shows positive electrodes and negative electrodes having different thickness dimension. Therefore, the EP'960 reference does not strictly require that the thickness dimension of both electrodes (i.e. the positive electrode and the negative electrode) be identical or the same. In other others, the EP'960 reference at once envisages different thickness for both electrodes. Thus, the battery of the EP'960 still meets the claimed ratio (A/B) requirement of being equal to or greater than 1.186.

B) **(Emphasis added→)** Furthermore, as illustrated in **Table 6- Examples 26-35**, the EP'960 reference shows with sufficient specificity that the thickness of the positive electrode is greater than the thickness of the negative electrode. That is to say, the EP'960 reference at once envisages the general concept of having positive electrode layers thicker than negative electrode layers. In addition to that, Table 6 correlates initial capacity of batteries to electrode thicknesses (page 38, lines 28-30).

Art Unit: 1745

Table 6 below shows specific examples wherein the thickness of the positive electrode differs from the thickness of the negative electrode:

Table 6

	Capacity (Ah)	Thickness of one layer of positive electrode (μm)	Thickness of one layer of negative electrode (μm)
Example 26	0.32	48	45
Example 27	0.35	50	56
Example 28	0.30	39	36
Example 29	0.29	24	23
Example 30	0.12	10	9.5
Example 31	0.30	48	45
Example 32	0.31	49	45
Example 33	0.33	49	45
Example 34	0.31	48	45
Example 35	0.28	48	45
Example 36	0.36	60	65
Example 37	0.39	80	80
Example A	0.35	87	90
Example B	0.05	8	8
Comparative example 12	0.30	105	108
Comparative example 13	0.10	8	8

(Continued)

10. In response to applicant's arguments about "*the charge capacity of the battery and the metal precipitation*", the examiner strenuously points out that there is a relationship between the ratio (A/B) of the thickness of the positive electrode layer and the negative electrode layer thickness and the battery charge capacity allowing the specific Li-precipitation. Applicant's attention is respectfully but energetically directed to the "Examiner's Note" above (in the body/text of the rejection) which provides a detailed analysis and clearly explains such relationship which can be further characterized in that the claimed charge capacity-Li precipitation does occur as long as the ratio (A/B) of the positive electrode thickness and negative electrode thickness is equal to or more than 0.92. Thus, as long as the prior art of record does teach such specific (A/B) ratio magnitude, the battery of the prior art will be able to achieve the charge capacity-Li precipitation characteristic as instantly claimed. And so, it is ultimately stated that the prior art of record still provides the necessary functional and structural interrelationship to meet the specifically claimed requirement.

11. Although believed unnecessary due to the new grounds of rejection, the examiner likes to address certain applicants' arguments. In response to applicants' arguments that the prior art of record does not disclose the specific ratio (A/B) between the positive electrode and negative

electrode, the examiner wishes to point out that given that the EP'960 reference has clearly disclosed that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85 μm , as well, in general, electrode layers having a thickness of 10-100 μm , it is fairly reasonable to contend that the EP'960 reference envisions at first the claimed thickness, and consequently, the claimed ratio A/B. For instance, if the upper limit in the thickness for the positive electrode is chosen to be 85 μm , then the thickness of the negative electrode can be thus chosen to be 81 μm which still satisfies a preferred electrode thickness; or in the other hand, if the positive electrode thickness is chosen to be 100 μm , then the thickness of the negative electrode can be thus chosen to be 96 which is still within the generally disclosed range. In this regard, it is noted that this examiner's position is taken in light of the specific electrode thickness exemplified in TABLE 6 (See portions of TABLE 6 below) which shows positive electrodes and negative electrodes having different thickness dimension. Therefore, the EP'960 reference does not strictly require that the thickness dimension of both electrodes (i.e. the positive electrode and the negative electrode) be identical or the same. In other others, the EP'960 reference at once envisages different thickness for both electrodes. Thus, the battery of the EP'960 still meets the claimed ratio (A/B) requirement of being equal to or greater than 1.186.

12. Additionally, in view of the fact that the EP'960 reference teaches that the upper limit in the thickness for both the positive electrode and the negative electrode is preferably 85 μm , as well, in general, electrode layers having a thickness of 10-100 μm , and that these thickness are preferable simply because if the electrode layer is thicker than the specific dimension, the non-aqueous electrolyte concentrates on the surface of the positive electrode at rapid change and at

rapid discharge, and as a result, the electrode reaction scarcely proceeds inside the electrode, leading to a shortened cycle life; in addition, where the thickness falls within this range, the large discharge characteristics and the cycle life are markedly improved. Thus, one of ordinary skill in the art would find good motivation to make positive electrodes and negative electrodes within the claimed range. Hence, the EP'960 reference directly teaches the electrode thickness within the claimed range, and still meets the claimed ratio (A/B) requirement of being equal to or greater than 1.038. Accordingly, the EP'960 reference recognizes that the electrode thickness per se is a variable which achieves a recognized result, thus, the claimed range of the electrode thickness and thus, the A/B ratio result from the characterization as routine experimentation of an optimum or workable range. Accordingly, the electrode thickness is being construed as a result-effective variable. *In re Aller* 105 USPQ 233, 235; *In re Hoeschele* 160 USPQ 809, *In re Antonie* 195 USPQ 6 (See MPEP 2144.05 II. Optimization of Ranges).

13. Moreover, where the only difference between the prior art and the claims is a recitation of relative dimensions (*i.e. changes in size/proportion*) of the claimed feature and a feature having the claimed relative dimensions would not perform differently than the prior art device/element/member, the claimed device/element/member is not patentably distinct from the prior art device/element/member. That is, limitations relating to the size of the feature/element/member are not sufficient to patentably distinguish over the prior art as it is noted that changes in size (*thickness*) is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular thickness of the claimed electrode is significant. *In re Rose* 105 USPQ 237; *In re Rinehart* 189 USPQ 143; *In Gardner v. TEC*

Art Unit: 1745

Systems, Inc., 220 USPQ 777 & 225 USPQ 232, (See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale).

14. The assertion that the prior art of record fails to reveal “*the specific charge capacity/characteristic*” is still insufficient to overcome this rejection. In this regard, it is noted that applicants have argued that the battery of the present invention is specifically engineered to avoid the precipitation of lithium metal (in order to attain the specific second capacity component) by simply featuring a battery comprising a negative electrode comprising a graphitic material with certain charge capacity and a positive electrode of Li-oxide based material.

Nevertheless, since the battery of the prior art does include the same positive electrode and negative material composition, the specific characteristic/function of occluding/releasing and/or precipitating/dissolving light metals is inherent because products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property i.e. capable of occluding and releasing light metal, and capable of precipitating and dissolving light metal thereon is necessarily present in the prior art active material.

Therefore, because the examiner has provided a substantive sound basis and a technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art, and therefore, to assert that the specific claimed occluding/releasing and/or precipitating/dissolving light metals characteristics are inherent to the very same nature of the positive electrode and negative electrode material composition of the prior art battery (*as also argued by applicants*). Applicants’ attention is particularly directed to the Examiner’s Note presented hereinabove (refer to the Examiner’s Note in body of the rejection above). In consequence, the prior art’s battery seems to be identical

Art Unit: 1745

except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in the specific method described in the reference, and that it would be so recognized by persons of ordinary skill. As a result, once a reference teaching method appearing to be substantially identical is made the basis of the rejection, and the examiner presents evidence or reasoning tending to show inherency, the burden shifts to the application to show an unobvious difference. Hence, applicants need to prove the prior art does not necessarily or inherently possess the characteristics, and/or function of his/their secondary battery. *In re Fitzgerald* 205 USPQ 594, 596 and *In re Best* 195 USPQ 430 (See ***MPEP 2112. Requirements of Rejection Based on Inherency***).

As a result, the examiner asserts that it is not enough that applicant's representative personally believe that the prior art does not perform or teach such inherently identified characteristic/function. That is to say, the arguments of counsel cannot take the place of evidence in the record. An assertion of what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of inherent anticipation/obviousness (See ***MPEP 2145 Consideration of Applicant's Rebuttal Arguments***).

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

Art Unit: 1745

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Primary Examiner
Art Unit 1745



RAYMOND ALEJANDRO
PRIMARY EXAMINER